

Release notes for ENDF/B Development n-044\_Ru\_102  
evaluation

**ENDF**  
**B-VII**.dev

April 26, 2017

- checkr Warnings:

1. A previous error halted parsing of the current section  
*MAT=4443, MF= 1, MT=451 (1): Parsing stopped*

```
ERROR(S) FOUND IN MAT=4443, MF= 1, MT=451
SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER 148 TO 191
```

- checkr Errors:

1. A variable is outside the allowed ENDF range  
*MAT=4443, MF= 1, MT=451 (0): Variable range*

```
ERROR(S) FOUND IN MAT=4443, MF= 1, MT=451
MOD = 1 OUT OF RANGE 0 - 0 RECORD NUMBER 148
```

2. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 2, MT=151 (0): Directory (b)*

```
ERROR(S) FOUND IN MAT=4443, MF= 2, MT=151
SECTION 2/151 NOT IN DIRECTORY RECORD NUMBER 193
```

3. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 3, MT= 1 (0): Directory (b)*

```
ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 1
SECTION 3/ 1 NOT IN DIRECTORY RECORD NUMBER 401
```

4. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 3, MT= 2 (0): Directory (b)*

```
ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 2
SECTION 3/ 2 NOT IN DIRECTORY RECORD NUMBER 452
```

5. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 3, MT= 4 (0): Directory (b)*

```
ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 4
SECTION 3/ 4 NOT IN DIRECTORY RECORD NUMBER 503
```

6. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 3, MT= 16 (0): Directory (b)*

```
ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 16
SECTION 3/ 16 NOT IN DIRECTORY RECORD NUMBER 538
```

7. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 3, MT= 17 (0): Directory (b)*

- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 17 |                   |
| SECTION 3/ 17 NOT IN DIRECTORY            | RECORD NUMBER 558 |
8. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 22 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 22 |                   |
| SECTION 3/ 22 NOT IN DIRECTORY            | RECORD NUMBER 568 |
9. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 28 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 28 |                   |
| SECTION 3/ 28 NOT IN DIRECTORY            | RECORD NUMBER 588 |
10. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 51 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 51 |                   |
| SECTION 3/ 51 NOT IN DIRECTORY            | RECORD NUMBER 603 |
11. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 52 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 52 |                   |
| SECTION 3/ 52 NOT IN DIRECTORY            | RECORD NUMBER 638 |
12. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 53 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 53 |                   |
| SECTION 3/ 53 NOT IN DIRECTORY            | RECORD NUMBER 671 |
13. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 54 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 54 |                   |
| SECTION 3/ 54 NOT IN DIRECTORY            | RECORD NUMBER 703 |
14. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 55 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 55 |                   |
| SECTION 3/ 55 NOT IN DIRECTORY            | RECORD NUMBER 735 |
15. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 56 (0): Directory (b)

- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 56 |                   |
| SECTION 3/ 56 NOT IN DIRECTORY            | RECORD NUMBER 766 |
16. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT= 91 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT= 91 |                   |
| SECTION 3/ 91 NOT IN DIRECTORY            | RECORD NUMBER 797 |
17. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=102 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=102 |                   |
| SECTION 3/102 NOT IN DIRECTORY            | RECORD NUMBER 827 |
18. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=103 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=103 |                   |
| SECTION 3/103 NOT IN DIRECTORY            | RECORD NUMBER 855 |
19. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=104 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=104 |                   |
| SECTION 3/104 NOT IN DIRECTORY            | RECORD NUMBER 879 |
20. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=105 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=105 |                   |
| SECTION 3/105 NOT IN DIRECTORY            | RECORD NUMBER 896 |
21. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=106 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=106 |                   |
| SECTION 3/106 NOT IN DIRECTORY            | RECORD NUMBER 910 |
22. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 3, MT=107 (0): Directory (b)
- |   |                   |
|---|-------------------|
| ERROR(S) FOUND IN MAT=4443, MF= 3, MT=107 |                   |
| SECTION 3/107 NOT IN DIRECTORY            | RECORD NUMBER 916 |
23. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF= 4, MT= 2 (0): Directory (b)

- |  |               |     |
|--|---------------|-----|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 2 | RECORD NUMBER | 935 |
| SECTION 4/ 2 NOT IN DIRECTORY            |               |     |
24. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 16 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 16 | RECORD NUMBER | 1421 |
| SECTION 4/ 16 NOT IN DIRECTORY            |               |      |
25. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 17 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 17 | RECORD NUMBER | 1472 |
| SECTION 4/ 17 NOT IN DIRECTORY            |               |      |
26. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 22 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 22 | RECORD NUMBER | 1495 |
| SECTION 4/ 22 NOT IN DIRECTORY            |               |      |
27. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 28 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 28 | RECORD NUMBER | 1546 |
| SECTION 4/ 28 NOT IN DIRECTORY            |               |      |
28. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 51 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 51 | RECORD NUMBER | 1585 |
| SECTION 4/ 51 NOT IN DIRECTORY            |               |      |
29. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 52 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 52 | RECORD NUMBER | 1794 |
| SECTION 4/ 52 NOT IN DIRECTORY            |               |      |
30. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 53 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 53 | RECORD NUMBER | 1879 |
| SECTION 4/ 53 NOT IN DIRECTORY            |               |      |
31. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 54 (0): Directory (b)*

- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 54 | RECORD NUMBER | 2074 |
| SECTION 4/ 54 NOT IN DIRECTORY            |               |      |
32. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 55 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 55 | RECORD NUMBER | 2259 |
| SECTION 4/ 55 NOT IN DIRECTORY            |               |      |
33. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 56 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 56 | RECORD NUMBER | 2451 |
| SECTION 4/ 56 NOT IN DIRECTORY            |               |      |
34. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 4, MT= 91 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 4, MT= 91 | RECORD NUMBER | 2643 |
| SECTION 4/ 91 NOT IN DIRECTORY            |               |      |
35. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 5, MT= 16 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 5, MT= 16 | RECORD NUMBER | 2725 |
| SECTION 5/ 16 NOT IN DIRECTORY            |               |      |
36. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 5, MT= 17 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 5, MT= 17 | RECORD NUMBER | 2955 |
| SECTION 5/ 17 NOT IN DIRECTORY            |               |      |
37. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 5, MT= 22 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 5, MT= 22 | RECORD NUMBER | 3045 |
| SECTION 5/ 22 NOT IN DIRECTORY            |               |      |
38. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 5, MT= 28 (0): Directory (b)*
- |   |               |      |
|---|---------------|------|
| ERROR(S) FOUND IN MAT=4443, MF= 5, MT= 28 | RECORD NUMBER | 3268 |
| SECTION 5/ 28 NOT IN DIRECTORY            |               |      |
39. Missing a section in directory so your directory is messed up. This error will break everything else  
*MAT=4443, MF= 5, MT= 91 (0): Directory (b)*

ERROR(S) FOUND IN MAT=4443, MF= 5, MT= 91  
SECTION 5/ 91 NOT IN DIRECTORY RECORD NUMBER 3431

40. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF=33, MT= 2 (0): Directory (b)

ERROR(S) FOUND IN MAT=4443, MF=33, MT= 2  
SECTION 33/ 2 NOT IN DIRECTORY RECORD NUMBER 3777

41. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF=33, MT= 4 (0): Directory (b)

ERROR(S) FOUND IN MAT=4443, MF=33, MT= 4  
SECTION 33/ 4 NOT IN DIRECTORY RECORD NUMBER 3867

42. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF=33, MT= 16 (0): Directory (b)

ERROR(S) FOUND IN MAT=4443, MF=33, MT= 16  
SECTION 33/ 16 NOT IN DIRECTORY RECORD NUMBER 3917

43. Missing a section in directory so your directory is messed up. This error will break everything else  
~~MAT=4443~~, MF=33, MT=102 (0): Directory (b)

ERROR(S) FOUND IN MAT=4443, MF=33, MT=102  
SECTION 33/102 NOT IN DIRECTORY RECORD NUMBER 3927

- **psyche** Warnings:

1. Gamma width not in agreement with PSYCHE's expectations  
FILE 2 / SECTION 151 / ISOTOPE MASS = 102. L = 1 / AT RESONANCE ENERGY 1.22120E+04 EV. THE GAMMA WIDTH 3.79000E-01 DEVIATES TOO MUCH FROM THE AVERAGE 1.07017E-01 (0): Gamma width

```
FILE 2
SECTION 151
ISOTOPE MASS = 102. L = 1
AT RESONANCE ENERGY 1.22120E+04 EV. THE GAMMA WIDTH 3.79000E-01 DEVIATES TOO MUCH FROM THE AV
```

- **groupie** Errors:

1. Very small elastic cross section found  
0: Small elastic

```
Multi-Group and Multi-Band Parameters from ENDF/B Data (GROUPE 2015-2)
-----
ENDF/B Input and Output Data Filenames
ENDFB.IN
ENDFB.OUT
... [97 more lines]
```

- **fudge-4.0** Warnings:

1. Missing a channel with a particular angular momenta combination  
*resonances / resolved / MultiLevel BreitWigner (Error # 0): missingResonanceChannel*

WARNING: Missing a channel with angular momenta combination L = 0, J = 1.5 and S = 1.5 for "capture"  
 WARNING: Missing a channel with angular momenta combination L = 1, J = 0.5 and S = 1.5 for "capture"  
 WARNING: Missing a channel with angular momenta combination L = 1, J = 1.5 and S = 1.5 for "capture"  
 WARNING: Missing a channel with angular momenta combination L = 1, J = 2.5 and S = 1.5 for "capture"

2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 0 (n + Ru102): / Form 'eval': / Component 0 (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 0 (n + Ru102): / Form 'eval': / Component 1 (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 1 ((z,n)): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 2 (n[multiplicity:'2'] + Ru101): / Form 'eval': (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 3 (Ru103 + gamma): / Form 'eval': / Component 0 (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.

*Section 3 (Ru103 + gamma): / Form 'eval': / Component 1 (Error # 0): Condition num.*

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

- fudge-4.0 Errors:

1. Calculated and tabulated Q values disagree.

*reaction label 8: n[multiplicity:'2'] + Ru101 (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -8225619.220687866 eV vs -9.2206e6 eV!

2. Calculated and tabulated Q values disagree.

*reaction label 9: n[multiplicity:'3'] + Ru100 (Error # 0): Q mismatch*



WARNING: Calculated and tabulated Q-values disagree: -15027672.61528015 eV vs -1.6022e7 eV!

3. Calculated and tabulated Q values disagree.  
*reaction label 10:  $n + H1 + Tc101$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -9057153.085876465 eV vs -1.0051e7 eV!

4. Calculated and tabulated Q values disagree.  
*reaction label 11:  $Ru103 + \gamma$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: 7226070.613952637 eV vs 6.2324e6 eV!

5. Calculated and tabulated Q values disagree.  
*reaction label 12:  $n + He4 + Mo98$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -2417213.953079224 eV vs -3.4113e6 eV!

6. Calculated and tabulated Q values disagree.  
*reaction label 13:  $H1 + Tc102\_s$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -2756009.683563232 eV vs -3.7475e6 eV!

7. Calculated and tabulated Q values disagree.  
*reaction label 14:  $H2 + Tc101\_s$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -6832586.984939575 eV vs -7.8262e6 eV!

8. Calculated and tabulated Q values disagree.  
*reaction label 15:  $H3 + Tc100\_s$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -8966286.642684937 eV vs -9.9606e6 eV!

9. Calculated and tabulated Q values disagree.  
*reaction label 16:  $He3 + Mo100\_s$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: -8779612.878997803 eV vs -9.7725e6 eV!

10. Calculated and tabulated Q values disagree.  
*reaction label 17:  $He4 + Mo99\_s$  (Error # 0): Q mismatch*

WARNING: Calculated and tabulated Q-values disagree: 3508219.708847046 eV vs 2651360. eV!

- njoy2012 Warnings:

1. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!  
*grouppr...compute self-shielded group-averaged cross-sections (0): GROUPR/conver (0)*

---message from conver---cannot do complete particle production for mt= 16  
only mf4/mf5 provided

2. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!  
*group...compute self-shielded group-averaged cross-sections (1): GROUPR/conver (0)*

---message from conver---cannot do complete particle production for mt= 17  
only mf4/mf5 provided

3. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!  
*group...compute self-shielded group-averaged cross-sections (2): GROUPR/conver (0)*

---message from conver---cannot do complete particle production for mt= 22  
only mf4/mf5 provided

4. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!  
*group...compute self-shielded group-averaged cross-sections (3): GROUPR/conver (0)*

---message from conver---cannot do complete particle production for mt= 28  
only mf4/mf5 provided

5. With the advent of the ENDF-6 format, it is possible to make evaluations that fully describe all the products of a nuclear reaction. Some carry-over evaluations from earlier ENDF/B versions also have this capability, but many do not. This message is intended to goad evaluators to improve things!  
*group...compute self-shielded group-averaged cross-sections (4): GROUPR/conver (0)*

---message from conver---cannot do complete particle production for mt= 91  
only mf4/mf5 provided